

# First Release

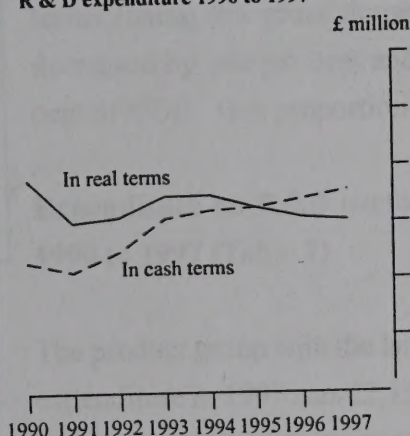
## Business Enterprise Research and Development 1997

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In 1997, in cash terms and compared to 1996:

R & D expenditure 1990 to 1997



- Total expenditure increased by two per cent to £9.6bn

- Civil expenditure increased by two per cent to £8.2bn

- Defence expenditure increased by four per cent to £1.3bn.

In 1997, in real terms (1995 prices) and compared to 1996:

- Total expenditure decreased by one per cent to £9.0bn

- Civil expenditure decreased by one per cent to £7.8bn

- Defence expenditure increased by one per cent to £1.3bn.

### Expenditure performed by Business Enterprise in cash & real terms 1993 to 1997

	£million				percentage change	
	1993	1994	1995	1996r	1997	96-97
<b>In cash terms</b>						
Civil	7,710	7,770	7,863	8,065	8,209	+2
Defence	1,359	1,433	1,391	1,297	1,343	+4
Total	9,069	9,204	9,254	9,362	9,553	+2
<b>In real terms (1995 prices)</b>						
Civil	8,048	7,996	7,863	7,824	7,762	-1
Defence	1,419	1,475	1,391	1,258	1,270	+1
Total	9,466	9,472	9,254	9,082	9,033	-1

r = revised

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## UK Business Enterprise R&D 1997

### Expenditure on R&D performed in UK businesses: cash and real terms; 1990 to 1997 (Table 1)

In 1997, £9.6 billion was spent on R&D performed within UK businesses - a rise of 2 per cent at current prices compared to the 1996 total. In real terms (using the gross domestic product (GDP) deflator), expenditure decreased by one per cent and in 1997 represented approximately 1.2 per cent of GDP. This proportion has declined from 1.5 per cent in 1990.

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### Expenditure on R&D performed in UK businesses: product groups, 1990 to 1997 (Table 2)

The product group with the largest R&D expenditure was pharmaceuticals: expenditure in 1997 was £2,151 million, 23 per cent of all spending. Other major product groups were motor vehicles and parts accounting for £963 million (10 per cent) and aerospace £893 million (9 per cent).

### Sources of funds for R&D performed in UK businesses: 1990 to 1997 (Tables 3 and 6)

Funding of R&D from businesses' "own funds" was £6,103 million in 1997 (64 per cent of the total). Funding of R&D in UK businesses from abroad was £1,856 million in 1997 (19 per cent of the total). Funding of R&D in UK businesses by the UK Government was £927 million in 1997 (10 per cent of the total). This proportion has declined from 17 per cent in 1990.

### Employment on R&D performed in UK businesses: 1990 to 1997 (Table 4)

The number of staff employed on R&D decreased by 3 per cent between 1996 and 1997. The number of scientists and engineers employed on R&D remained fairly static between 1990 and 1997, whilst employment in other categories fell.



**Expenditure on R&D performed within UK businesses: civil and defence, by broad product group, 1992 to 1997 (Table 5)**

In real terms, civil R&D fell by one per cent in 1997 and defence R&D increased by one per cent. In 1997 chemical products accounted for 34 per cent of the total civil R&D expenditure. The second largest civil R&D broad product group was services, accounting for 26 per cent of total civil R&D expenditure. Defence R&D continued to be dominated by aerospace and electrical machinery product groups.

**Regional breakdown for Business Enterprise expenditure on R&D in the UK, 1997 (Table 7)**

The regions with the largest R&D expenditure were the South East and Eastern. Both accounted for 24 per cent of the total expenditure.



## **BACKGROUND NOTES**

### **The 1997 Survey**

#### **Sample design**

1. Between 1985 and 1993 there were four-yearly large scale surveys. The 1993 survey was the last large scale survey and since then ONS has moved to an annual small scale, stand alone sample survey based on a continually updated register of R&D performers.
2. Approximately 1,600 forms were sent out to businesses believed to be performing R&D. These 1,600 companies were selected using a stratified sample.
3. The 364 largest R&D spenders in 1997 were all sampled. These accounted for 86 per cent of the 1997 total R&D expenditure figure. Smaller R&D performers and others believed to be performing R&D were selected using various sampling fractions. Industry group and company employment were the stratification variables.
4. Completed forms were returned by 1,501 businesses, representing a response rate of 94 per cent.
5. Estimates were made for the R&D activity of unsampled and non-responding businesses.

#### **Revisions to past data**

6. 1996 data have been revised where necessary to take into account misclassification and updated population information.
7. GDP and GDP deflators used have been revised in line with the new European System of Accounts (ESA95) definitions. (See ONS National Accounts First Release dated 24 September 1998).

#### **More detailed information**

8. A more detailed analysis of the results of this survey, and description of methods used, will be published in Business Monitor MA14, due for release in January 1999. It will be available from ONS Direct Tel: 01633 812078.



## Definitions

### Research and Experimental Development (R&D)

9. R&D and related concepts follow internationally agreed standards defined by the Organisation for Economic Co-operation and Development (OECD) and published in the Frascati manual. R&D is defined as "creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society and the use of the stock of knowledge to devise new applications".

### R&D performed in UK businesses

10. This refers to R&D performed in the UK within business enterprises. It excludes R&D funded by UK businesses that is performed overseas or in other sectors of the UK economy (such as higher education; government departments, agencies, and non-departmental public bodies; local authorities; and private non-profit organisations). Public corporations are counted as business enterprises.

### Product Groups

11. The broad product groups consist of aggregations of the detailed product groups. "Services" includes R&D consultancy and other services in support of manufacturing industry.

### Employment

12. Employment is calculated by respondents on the basis of "full-time equivalent" staff averaged over the year. The categories of employment used are:
  - **Scientists and Engineers:** professionals engaged in the conception or creation of new knowledge, products, methods and systems.
  - **Technicians:** qualified personnel who participate in R&D projects by performing scientific and technical tasks, normally under the supervision of professional scientists and engineers. They will usually have a scientific or engineering qualification.
  - **Administrative and Other:** other supporting staff, including skilled and unskilled craftsmen, secretarial and clerical staff participating in R&D projects or directly associated with such projects.



## **Rounding of Figures**

13. There may be discrepancies between totals and the sum of their independently rounded components.

## **General**

14. For information on available aggregated data on Research and Development please contact Jane Morgan on 01633 813109, e-mail [jane.morgan@ons.gov.uk](mailto:jane.morgan@ons.gov.uk).
15. Details of the policy governing the release of new data, including a description of the release categories featured on the front page of ONS releases, are available from the press office.
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# 1 EXPENDITURE ON R&D PERFORMED IN UK BUSINESSES: CASH AND REAL TERMS AND AS A PERCENTAGE OF GDP 1990 TO 1997

		£million							
		1990	1991	1992	1993	1994	1995	1996	1997
In cash terms	<b>DLBX</b>	8 318	8 135	8 489	9 069	9 204	9 254	9 362	9 553
In real terms (1995 prices)	<b>DLBC</b>	9 779	9 006	9 096	9 466	9 472	9 254	9 082	9 033
Current prices GDP	<b>DLBT</b>	562 674	589 836	612 630	647 249	685 805	722 909	764 314	813 672
As a % of GDP		1.5	1.4	1.4	1.4	1.3	1.3	1.2	1.2

1995 = 100

Source: Office for National Statistics

		1990	1991	1992	1993	1994	1995	1996	1997
GDP deflator used to convert cash terms to real terms	<b>DLKK</b>	85.1	90.3	93.3	95.8	97.2	100.0	103.1	105.8



# 2 EXPENDITURE ON R&D PERFORMED IN UK BUSINESSES: DETAILED PRODUCT GROUPS, 1990 TO 1997

		£million								£million
		1990 1991 1992 1993 1994 1995 1996 1997								% of total
										1997
<b>TOTAL</b>	<b>DLBX</b>	8 318	8 135	8 489	9 069	9 204	9 254	9 362	9 553	100
Agriculture, hunting and forestry; Fishing	DLBY	67	76	80	89	80	..	..	..	..
Extractive Industries	DLBZ	115	129	126	62	66	65	64	44	0.5
Food products and beverages; Tobacco products	DLCF	196	196	225	191	228	189	198	180	1.9
Textiles, clothing and leather products	DLCQ	19	23	25	44	22	23	27	33	0.3
Pulp, paper and paper products; Printing and publishing; Wood and straw products	DLCT	48	43	44	40	44	39	57	44	0.5
Refined petroleum products and coke oven products; Processing of nuclear fuel	DLCE	373	369	386	370	354	377	364	349	3.7
Chemicals, man-made fibres	DLCC	722	707	720	721	689	701	627	680	7.1
Pharmaceuticals, medical chemicals and botanical products	DLCD	1 206	1 199	1 446	1 679	1 820	1 813	1 852	2 151	22.5
Rubber and plastic products	DLCR	46	35	25	67	72	60	67	60	0.6
Other non-metallic mineral products	DLCS	53	44	43	42	56	54	60	47	0.5
Casting of iron and steel	DLCJ	50	40	43	50	51	46	39	39	0.4
Non-ferrous metals	DLCK	31	24	22	16	15	20	15	15	0.2
Fabricated metal products	DLCL	52	48	63	72	72	100	91	88	0.9
Machinery and equipment	DLCO	480	490	517	593	689	583	514	552	5.8
Office machinery and computers	DLCN	471	327	256	252	134	150	161	102	1.1
Electrical machinery and apparatus	DLCA	502	518	523	576	567	494	490	424	4.4
Radio, television and communication equipment	DLCB	593	484	479	558	517	602	662	655	6.9
Precision instruments	DLCM	268	276	283	312	273	303	307	336	3.5
Motor vehicles and parts	DLCG	571	605	636	682	669	795	946	963	10.1
Other transport equipment	DLCI	16	17	18	17	24	18	30	27	0.3
Shipbuilding and repairs	DLCH	33	16	16	18	17	20	20	15	0.2
Aerospace	DLCF	984	1 005	898	782	860	886	812	893	9.3
Furniture; Other manufactured goods	DLCU	20	20	22	28	28	21	16	25	0.3
Recycling	DLCV	1	1	1	1	1	..	1	—	—
Electricity, gas and water supply	DLCW	188	192	187	214	177	168	148	130	1.4
Construction	DLCX	19	19	15	11	11	8	8	10	0.1
Wholesale and retail trade	DLDE	4	4	4	5	6	8	4	5	0.1
Transport and storage	DLCY	7	8	10	13	8	15	..	..	..
Post and telecommunications	DLCE	341	317	386	389	408	414	455	496	5.2
Miscellaneous business activities; Technical testing and analysis	DLDC	144	146	156	195	181	..	141	112	1.2
Computer and related activities	DLDB	435	494	555	635	744	675	749	703	7.4
Research and development services	DLDA	244	244	261	329	311	247	389	333	3.5
Public administration	DLDD	19	19	18	16	10	14	17	13	0.1

1 .. denotes disclosive figures.

Source: Office for National Statistics



# 3 SOURCES OF FUNDS FOR R&D PERFORMED WITHIN UK BUSINESSES: 1990 TO 1997

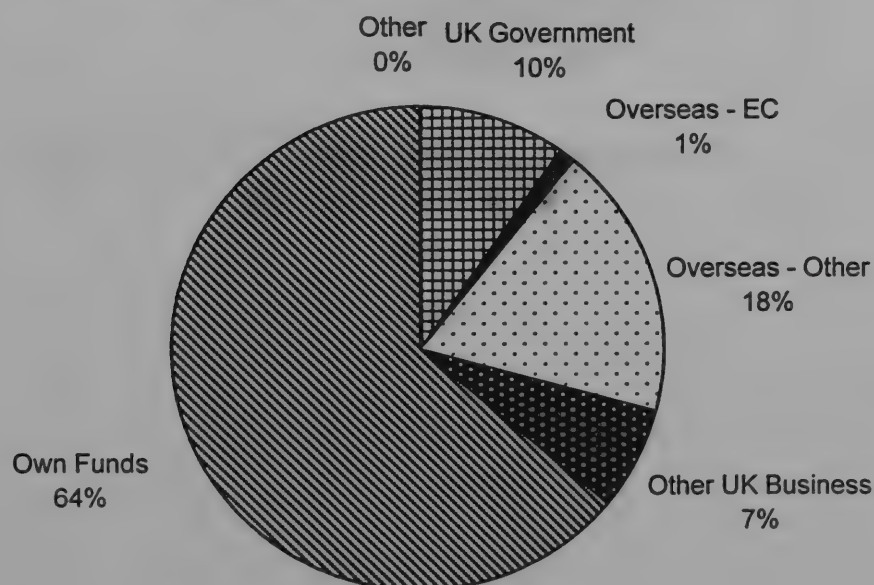
£million

		1990	1991	1992	1993	1994	1995	1996	1997
<b>£ MILLION</b>									
<b>TOTAL</b>	<b>DLEB</b>	8 318	8 135	8 489	9 069	9 204	9 254	9 362	9 553
UK Government	DLEO	1 392	1 189	1 171	1 129	1 088	1 050	899	927
Overseas total of which:	DLEK	1 289	1 299	1 270	1 398	1 474	1 748	2 047	1 856
EC Programmes	DLEQ	—	—	—	104	83	99	140	117
All other funding from abroad	DLES	—	—	—	1 294	1 390	1 649	1 908	1 739
Other UK Business	DLEU	478	498	565	613	583	731	723	667
Own funds	DLEW	5 160	5 149	5 483	5 903	6 040	5 723	5 688	6 103
Other	DLEY	—	—	—	26	19	3	5	1
<b>PERCENT</b>									
<b>TOTAL</b>	<b>DLEB</b>	100	100	100	100	100	100	100	100
UK Government	DLEO	17	15	14	12	12	11	10	10
Overseas total of which:	DLEK	15	16	15	15	16	19	22	19
EC Programmes	DLEQ	—	—	—	1	1	1	1	1
All other funding from abroad	DLES	—	—	—	14	15	18	20	18
Other UK Business	DLEU	6	6	7	7	6	8	8	7
Own funds	DLEW	62	63	65	65	66	62	61	64
Other	DLEY	—	—	—	—	—	—	—	—

1 From 1990 to 1992 source of funds for "other" was included with own funds.  
2 - denotes nil, figures unavailable or too small to display.

Source: Office for National Statistics

## Sources of funds for business R&D, 1997





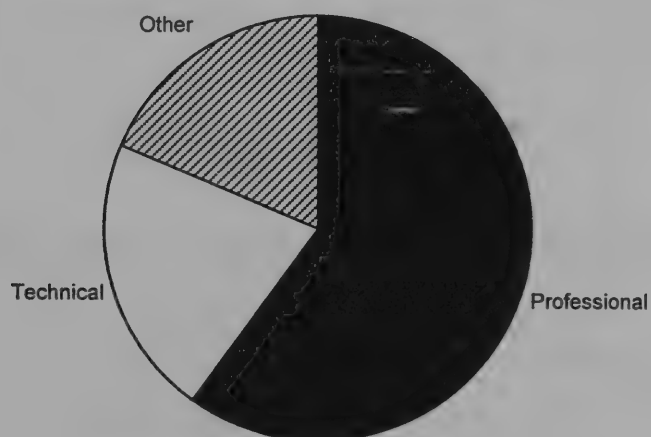
# EMPLOYMENT ON R&D PERFORMED WITHIN UK BUSINESSES: 1990 TO 1997

Full time equivalent in thousands

		1990	1991	1992	1993	1994	1995	1996	1997
<b>TOTAL</b>	<b>DLEI</b>	171	159	159	164	157	146	143	139
Scientists and engineers	<b>DLEJ</b>	83	80	82	86	83	83	83	84
Technicians, laboratory assistants and draughtsmen	<b>DLEK</b>	43	38	38	40	40	33	33	30
Administrative, clerical industrial and other staff	<b>DLEL</b>	45	41	39	37	34	30	27	26
<b>As % of total employment</b>									
Scientists and engineers	<b>DLEM</b>	48	50	51	52	53	57	58	60
Technicians, laboratory assistants and draughtsmen	<b>DLEN</b>	25	24	24	24	25	23	23	22
Administrative, clerical industrial and other staff	<b>DLEO</b>	27	26	25	23	22	20	19	19

Source: Office for National Statistics

## Employment on business R&D, 1997



- Professional = Scientists and engineers
- Technical = Technicians, lab assistants and draughtsmen
- ▨ Other = Admin, clerical, industrial and other staff



# EXPENDITURE ON CIVIL AND DEFENCE R&D PERFORMED IN UK BUSINESSES BY BROAD PRODUCT GROUPS, 1992 TO 1997

£million

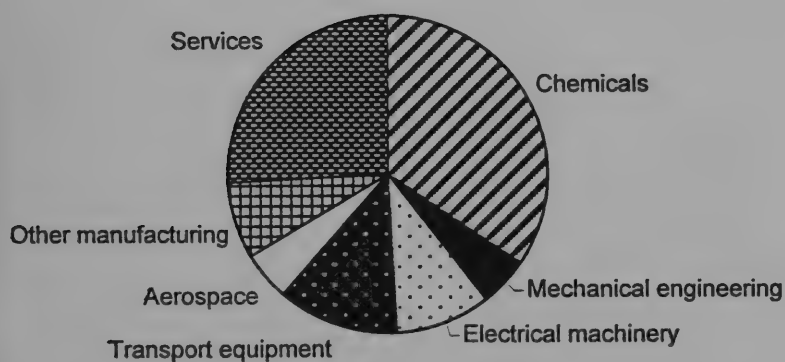
		Civil						Defence						
		1992	1993	1994	1995	1996	1997		1992	1993	1994	1995	1996	1997
In cash terms														
TOTAL	DLEV	7 092	7 710	7 770	7 863	8 065	8 209	DLEW	1 397	1 359	1 433	1 391	1 297	1 343
Manufacturing	DLEP	5 050	5 550	5 534	5 603	5 787	6 094	DLEX	1 254	1 193	1 314	1 291	1 205	1 234
Chemicals	DLEQ	2 238	2 473	2 590	2 511	2 477	2 829	DLEY	20	26	10	3	2	2
Mechanical engineering	DLER	325	398	405	395	395	407	DLEZ	236	246	335	266	210	232
Electrical machinery	DLES	885	999	827	823	896	803	DLFA	357	377	379	423	417	377
Transport equipment	DLET	574	622	661	823	987	994	DLFB	64	59	14	10	10	11
Aerospace	DLEU	403	374	380	413	359	412	DLFC	493	412	481	473	453	481
Other manufacturing	DLEV	625	684	671	639	673	648	DLFD	84	73	95	116	113	131
Services	DLEW	2 042	2 160	2 236	2 260	2 277	2 115	DLFE	143	166	120	99	92	109

		Civil							Defence						
		1992	1993	1994	1995	1996	1997		1992	1993	1994	1995	1996	1997	
In real terms (1995 prices)															
TOTAL	DLBA	7 599	8 048	7 996	7 863	7 824	7 762	DLBB	1 497	1 419	1 475	1 391	1 258	1 270	
Manufacturing	DLBD	5 411	5 793	5 695	5 603	5 614	5 762	DLBL	1 344	1 245	1 352	1 291	1 169	1 167	
Chemicals	DLBE	2 398	2 581	2 665	2 511	2 403	2 675	DLEM	21	27	10	3	2	2	
Mechanical engineering	DLBF	348	415	417	395	383	385	DLBN	253	257	345	266	204	219	
Electrical machinery	DLBG	948	1 043	851	823	869	759	DLBO	383	394	390	423	405	356	
Transport equipment	DLBH	615	649	680	823	958	940	DLBP	69	62	14	10	10	10	
Aerospace	DLBI	432	390	391	413	348	390	DLBQ	528	430	495	473	439	455	
Other manufacturing	DLBJ	670	714	691	639	653	613	DLBR	90	76	98	116	110	124	
Services	DLBK	2 188	2 255	2 301	2 260	2 209	2 000	DLBS	153	173	123	99	89	103	

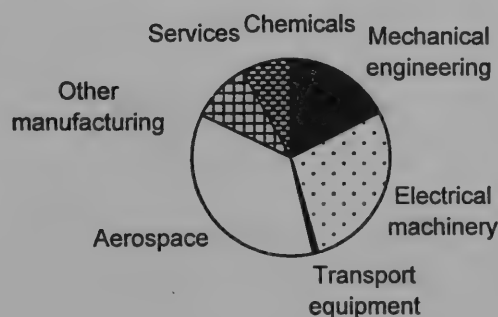
Source: Office for National Statistics

## Civil and defence R&D expenditure by broad product groups, 1997

Civil



Defence





# SOURCES OF FUNDS FOR CIVIL AND DEFENCE R&D IN UK BUSINESSES: 1992 TO 1997

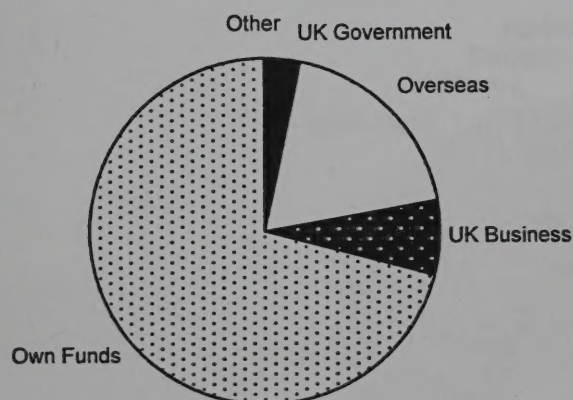
£million

		Civil						Defence					
		1992	1993	1994	1995	1996	1997	1992	1993	1994	1995	1996	1997
UK Government	DLFG	478	390	363	321	253	280	DLFN	693	739	726	729	646
Overseas total of which:	DLHS	981	1 103	1 135	1 419	1 755	1 543	DLIF	289	295	338	329	292
EC Programmes	DLFH	—	104	83	99	140	117	DLFO	—	—	—	—	—
All other funding from abroad	DLFI	—	999	1 052	1 320	1 615	1 426	DLFP	—	295	338	329	292
Other UK Business	DLFJ	430	537	505	672	655	580	DLFQ	135	76	78	59	68
Own	DLFK	5 203	5 660	5 749	5 449	5 397	5 805	DLFR	280	242	292	274	290
Other	DLFL	—	20	18	3	5	1	DLFS	—	6	—	—	—
<b>TOTAL</b>	<b>DLBV</b>	<b>7 092</b>	<b>7 710</b>	<b>7 770</b>	<b>7 863</b>	<b>8 065</b>	<b>8 209</b>	<b>DLBW</b>	<b>1 397</b>	<b>1 359</b>	<b>1 433</b>	<b>1 391</b>	<b>1 343</b>

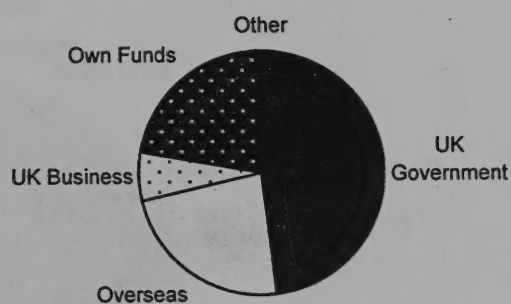
Source: Office for National Statistics

## Source of funds, 1997

Civil



Defence





# 7 GOVERNMENT OFFICES REGIONAL BREAKDOWN OF R&D PERFORMED WITHIN UK BUSINESSES: EXPENDITURE AND EMPLOYMENT, 1997

		Expenditure £million 1997		% of total 1997		Employment FTE in thousands 1997
United Kingdom	DLBX	9 553	DLBN	100	DLEI	139
England	DLKI	9 003		94.2	DLKJ	129
North East	DLJO	216		2.3	DLJZ	4
North West and Merseyside						
North West	DLJT	999		10.5	DLKE	14
Merseyside	DMRG	188		2.0	DMRH	3
Yorkshire and Humber	DLJP	256		2.7	DLKA	6
East Midlands	DLJQ	679		7.1	DLKB	11
West Midlands	DLJN	647		6.8	DLJY	12
Eastern	DLJR	2 303		24.1	DLKC	28
London	DLKL	659		6.9	DLKM	9
South East	DLJS	2 296		24.0	DLKD	30
South West	DLJM	760		8.0	DLJK	12
Wales	DLJU	113		1.2	DLKF	2
Scotland	DLJV	356		3.7	DLKG	7
Northern Ireland	DLJW	81		0.8	DLKH	2

Source: Office for National Statistics

Regional breakdown for business R&D, 1997

